Syncope
Rhythmic syncope and differential syncope in Mojeño Trinitario

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Puzzle #1

• In the reduplication process, the copy and base may not look similar at all!

`t-ema're-re-ko`
3-be_lightening-RED-ACT ‘There is a sequence of lightning.’

`t-çi:-'wo-hi`
3-rain-RED-ACT ‘It is raining a lot’
Puzzle #2

• The third person prefix has two allomorphs with an unexpected distribution
  
t- / _C or {front vowel}
  c- / _{non-front vowel}

  \textit{t-}inko ‘it’s full’
  \textit{c-}amo ‘it is swollen’
Puzzle #3

• Adding a morpheme may only show through vowel subtraction.

\(\text{tanosi} \quad \text{‘It stayed.’}\)
\(\text{ta-nosi}\)
\(3\text{NH-stay}\)

\(\text{tansi} \quad \text{‘Let it stay!’}\)
\(\text{ta-a-nosi}\)
\(3\text{NH-IRR-stay}\)
Puzzle #4

- Variants of the –ko active suffix that superficially seem to be morphologically conditionned

  \textit{na-ni-ko} \quad ‘they eat it’

  \textit{na-ni-\c{s}-paːʔi} \quad ‘let them eat it while they go’ (IRR + CONC.MOT)

  \textit{na-ni-s-ʔo} \quad ‘they eat with it’ (APPL)
A single rhythmic syncope process account for these phenomena

Weak moras are subject to deletion throughout the word
Demonstration

*huma* ‘illness’

(1) *nu-huma* → *nhuma* ‘my illness’
(2) *huma-re* → *hmare* ‘illness’
(3) *ti-ko-huma* → *tkohma* ‘I am sick’
(4) *ti-ku-ko-huma* → *tkukhuma* ‘that he is not sick’
Roadmap

• Weak moras are subject to deletion throughout the word
• In fact, underapplication: only most weak moras delete.

Questions
  • What are the weak moras?
  • What are the vowels immune to deletion?
Overview

• Mojeño Trinitario
• Syncope
• Constraints
  • Root classes
  • Vowel quality
  • Morphology
  • Segmental phonotactics
• Summary: description, theory and typology
Mojeño Trinitario

- Arawak, Lowland Bolivia
- Mojeño Trinitario
  - Dictionary (Gill 1993)
  - Handbook (Gill 1957)
- Other extant dialect: Mojeño Ignaciano
  - Dictionary (Ott & Ott 1983)
  - Grammar (Olza Zubiri 2002)
- Old Mojeño
  - Lingua franca of the Jesuit missions (Saito 2009)
  - Grammar and bilingual catechism (Marbán 1701)
Mojeño Trinitario

• Corpus collected since 2005
  • 6 hours of (semi)-spontaneous texts (audio)
  • 1h40mn of sentences elicited with stimuli (audio)
  • 3000 elicited sentences
  • 2000 roots and affixes

• Grammatical sketch (Rose 2015)

• Papers on morphosyntax and genderlects
  • www.ddl.ish-lyon.cnrs.fr/ROSE
Mojeño – Phonological systems

- word-initially \((C)(C)V(C/ː)\)
- word-internally \(CV(C/ː)\)
- word-finally \(CV\)

Underlying system
Additions in the surface system

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Mojeño – Morphology

• Word as prosodic unit within which stress, syncope and segmental phonotactics apply

• Agglutinating to polysynthetic
  • One to three prefix slots
  • More than 10 suffix/clitic slots
  • Suffixes & clitics w/ same phonological behavior

• Bare roots are rare
Syncope

• 'syncope': non-final vowel deletion
• 'metrically-conditioned syncope': a process by which the properties of the metrical structure determine which vowels delete (McCarthy 2008)
• 'rhythmic syncope': deletion of vowels in weak metrical positions
  • A case for intermediate positions in derivative phonology
  • Often accounted for within OT (Kager 1997, Gouskova 2003, etc.)
Syncope

• Known cases of rhythmic syncope
  • Chicham (a.k.a. Jivaroan) languages, such as Aguaruna (McCarthy 2008), Wampi (Peña 2015); Macushi (Kager 1997)
  • Odawa and Ojibwe (Bloomfield 1957, Kaye 1973, Piggott 1974 [1980]), Potawotami (Lockwood 2012), Tlingit (Cable 2004), Hopi (Gouskova 2003), Southeastern Tepehuan (Kager 1997, Gouskova 2003), Tonkawa (Gouskova 2003)
  • Latin (Jacobs 2014)
Syncope

• Differential syncope (Gouskova 2003, Crosswhite 2004)
  • scalar treatment of vowels depending on their sonority (Prince & Smolensky 1993)

+ sonorous  \ a > e, o > u, i > ə  -sonorous

• constraints to ban sonorous vowels from non-prominent positions
• constraints to ban low-sonority vowels from prominent positions
Syncope in Mojeño

• Previous account by Gill (1957)
  • In terms of classes of roots and affix allomorphs
  • Linear process of alternation of classes
  • Not a unified account at word level
Syncope in Mojeño

• Specificities of syncope in Mojeño Trinitario
  • Metrical parse is not straightforward, with two major patterns
  • Role of vowel quality
    • Hybrid syncope: both metrically-conditionned and differential syncope
  • A high degree of morphological complexity, w/ rich phonotactics
    • Sequential effects
Syncope in Mojeño

1. Word formation
2. Metrical parse/ Stress placement
3. Syncope
4. Syllabification
Syncope in Mojeño

• Metrical parse
  • Iterative iambic footing
  • Starting from left edge
  • Final extrametricality

• Stress
  • On the rightmost foot (i.e. on penultimate or antepenultimate)
    Secondary stress on first foot.
Syncope in Mojeño

• But lexically-marked stress for some roots and affixes
  • Trochaic footing in some environments
  • Starting from left edge
  • Without extrametricality
Syncope in Mojeño

• Syncope
  • Weak moras
  • Unfooted moras
  • Never the final mora

• Syllabification
  • From left to right
  • Codas preferred over complex onsets
  • Complex onsets allowed word-initially only
  • Moraic stability
Syncope in Mojeño

• Words with an odd number of moras

\[
\begin{array}{cccc}
\text{nu-} & \text{ta} & \text{nV} & \text{-ko} \\
\text{(. x)} & \text{(. x)} & \text{(. x)} & < > \\
\text{n_} & \text{ta} & \text{n_} & \text{ko} \\
\text{ntan.kow.'re.po} & \text{w_} & \text{re} & \text{po} \\
\end{array}
\]

word formation
metrical parse
stress placement
syncope
syllabification

• 7 moras / 4 syllables
• Closed syllables, except last two syllables
• Penultimate stress in UR and SR

_ = position of deleted vowel
Syncope in Mojeño

• Words with an even number of moras

nu- ta nV -ko -wo re  word formation
( . x ) ( . x )  < >  metrical parse
x  stress placement
n_ ta n_ ko w_ re  syncope
ntan.'kow. re  syllabification

• 6 moras / 3 syllables
• Closed syllables, except final one
• Antepenultimate stress in UR, penultimate in SR
Syncope in Mojeño

• Constraints on this general principle
  • Root classes
  • Vowel quality
  • Morphology
  • Segmental phonotactics
Root classes

• 3 major root classes
  • Class 1. CV.'CV.CV
    • Regular iambic metrical parse
    • Often trimoraic, also longer roots
  • Class 2.
    • Class 2A. 'CV.CV - bimoraic
    • Class 2B. 'CV.CV.CV – trimoraic with lexically-marked antepenultimate stress
    • Trochaic pattern in word-initial position
    • Iambic pattern otherwise
Root classes - Class 1. CV.'CV.CV

• Trimoraic roots, with iambic metrical parse and regular syncope
  
  pokure → 'pkure
  su-pokure → 'spokre
  nu-etföhi-ko → netf'hiko
  sibiβi-re → 'sibiβre
  erepo-çira → ?rep'çira

  'canoe'
  'her canoe'
  'I speak'
  'flute.NPOSD'
  'small calabash'

• Immunity to syncope in some roots (esp. root-final vowels)
  sVmeno-çira → smeno'çira 'small woods'

V = vowel that is deleted
V = vowel of a weak mora that is maintained
Root classes - Class 2A. 'CV.CV

• Bimoraic roots, iambic pattern when prefixed
  \( nu\_huma \rightarrow 'nhuma \) 'my illness'
  \( ti\_ko\_huma \rightarrow 'tkohma \) '(s)he/it is sick'
  \( nu\_kop\_ko\_jore \rightarrow nkop'kojre \) 'I will lend'

• Immunity to syncope in some roots
  \( ti\_ko\_t\textbf{f}itf\textbf{a} \rightarrow tkot\textbf{f}it\textbf{a} \) 'she has a child'
  \( nu\_kop\alpha\_ko\_jore \rightarrow nkopa'kojre \) 'I will kill'
Root classes - Class 2A. 'CV.CV

• Bare root without syncope
• Trochaic foot
• Minimality effect

ju  ku  word formation
(x .)  metrical parse/stress
ju  ku  syncope
'juku  syllabification

(x .) color is used to highlight trochees
Root classes - Class 2A. 'CV.CV

• With suffixes (when no prefix), variation if found.
• Both types of feet are found
• Some vowels are immune to syncope

\[
\begin{align*}
\text{hu} & \quad \text{ma} & \quad \text{-re} \\
(\cdot \quad x) & \quad < & \quad > \\
\text{h}_\_
\quad \text{ma} & \quad \text{re} \\
\text{'hma.re} \\
\end{align*}
\]

\[
\begin{align*}
\text{mi} & \quad \text{ro} & \quad \text{-re} \\
(\cdot \quad x) & \quad < & \quad > \\
\text{mi.'ro.re} \\
\end{align*}
\]

\[
\begin{align*}
\text{e} & \quad \text{to} & \quad \text{-na} \\
(x & \quad .) \\
\text{eto} & \quad \text{na} \\
\text{'etona} \\
\end{align*}
\]

\_ = position of deleted vowel
V = vowel immune to syncope
Root classes - Class 2A. 'CV.CV

• Trochaic pattern also with more moras suffixed
• Some vowels are immune to syncope

pa ku -çi ra   pe ti -çi ra   word formation
(x .) (X .)   (x .) (X .)
pa k_ či ra    pe ti či ra    metrical parse/stress
pak.'çi.ra     pe.ti.'çi.ra   syncope
                syllabification
Root classes - Class 2B. 'CV.CV.CV

- Trimoraic with antepenultimate stress
- Trochaic foot
- Root V2 is usually immune to deletion
- Suspected to derive diachronically from 'CVCV-CV

so ɲo re  word formation
(x .)  metrical parse/stress
so ɲo re  syncope
'so.ɲo.re  syllabification
Root classes - Class 2B. 'CV.CV.CV

• Also trochaic pattern when suffixes only.
• Root V2 is usually immune to deletion.

so ra re -ç ra word formation
(x .) (X .) metrical parse/stress
so ra re ç_ ra syncope
so.ra.'reç.ra syllabification
Root classes - Class 2B. 'CV.CV.CV

• Iambic pattern when root is prefixed.
• Root V2 is usually immune to deletion

\[
\begin{align*}
\text{ti-βenopo} & \rightarrow 't\betaenopo \quad \text{'it falls'} \\
\text{ti-βenopo-po} & \rightarrow t\betaeno'popo \quad \text{'it fell'}
\end{align*}
\]
Root classes - Summary

• Summary on metrical parse
  • Iambic pattern with final extrametricality is more frequent
  • Trochaic pattern on word-initial Class 2 roots

• Summary on syncope
  • Underapplication on V2 of Class 2 roots
  • Some underapplication elsewhere in Class 2 and Class 1 roots
Vowel quality

• The 5 vowels /a, e, i, o, u/ can delete

• Vowel quality plays a role in determining underapplication of syncope
  • in roots, especially Class 2 roots
  • in affixes

• Continuum of proneness to delete

+prone  u, o  i  e, a  -prone
Vowel quality in roots

\[
\begin{align*}
h_{\text{uma}}\text{-re} & \rightarrow 'hmare & \quad '\text{illness.NPSD}' \\
m_{\text{iro}}\text{-re} & \rightarrow mi'\text{rore} & \quad '\text{face.NPSD}' \\
s_{\text{u}}\text{-ku-hunopo} & \rightarrow skuh'\text{nopo} & \quad '\text{that she does not run}' \\
p_{\text{i}}\text{-ku-}\beta\text{enopo} & \rightarrow pkuβe'\text{nopo} & \quad '\text{that you do not fall}'
\end{align*}
\]

• Deletion is lexically determined

\[
\begin{align*}
\text{u}t\text{fu} & \ '\text{go out}' \ vs. \ peno & \ '\text{house}' \\
\text{ti-utfu-hi-ko}, \text{ti-utfu-ko-jore-puka}, \text{ti-utfu-ku-}?qo\text{-jore}, \text{ta-utfu-miro-}\underline{u}-tfo\text{-worepo-iji} \\
\text{pi-peno-çereko-ri}?i, \text{su-peno-ri}?i, \text{su-peno-pori}?i, \text{pi-peno-jore}
\end{align*}
\]
Vowel quality in –CVCV suffixes/clitics

-/=çene GEN.PAT.NZ, INTENS
= tô'o 'still'
= hiŋa INTENS
= noŋe HAB
= puŋa SPEC
= riʔi IPFV
= roʔo 'fast'
= wore 'once again, also'
= jore FUT
-tʃiŋa EMP
-çiŋa DIM

-/=.hiwo INTENS
-koŋo REC
-koŋe POT.PAT.NZ
-more 'fan'
-numo SUBS.MOT
-pono 'more' + REV.MOT
-raʔi HAB.A.NZ
-raʔo SUBST
-sare HAB.PAT.NZ
-taŋa DESP
-woŋo PL
Vowel quality - Summary

• Continuum of proneness to delete
  +prone u, o i e, a -prone

• In roots and all type of bound morphology
Morphology - Reduplication

• The vowels of ~CV or ~CVCV copy in reduplication do not delete

\[ t̓i\text{-}ih\text{-}vre\text{-}re\text{-}hi \rightarrow tih\text{'}\text{'}rerehi \]

\[ \beta i\text{-}amo\text{-}momo\text{-}\text{ʔo} \rightarrow \beta iam\text{'}momo\text{ʔo} \]

'it's very hot'

'we are swollen'
Morphology - -VCV suffixes

• Two -VCV suffixes are lexically stressed: -ono PL, -oβi 1PL
• They start a new trochaic pattern (after hiatus resolution).

\[
\begin{align*}
\text{ti-} & \quad \text{ʧo} & \quad \text{wo} & \quad -\text{ono} & \quad -\text{jo} & \quad \text{re} & \quad \text{word formation} \\
\text{to} & \quad \text{ʧo} & \quad \text{wo} & \quad \text{no} & \quad \text{jo} & \quad \text{re} & \quad \text{hiatus resolution} \\
(.* & \quad (x & \quad (x & \quad (X & \quad .) & \quad (X & \quad .) & \quad \text{metrical parse/stress} \\
\text{t}_ & \quad \text{ʧo} & \quad \text{wo} & \quad \text{n}_ & \quad \text{jo} & \quad \text{re} & \quad \text{syncope} \\
\text{tʧo.won.'jo.re} & \quad \text{syllabification} \\
\end{align*}
\]
Morphology – Lexicalization and frequency

• Root *kuhu* 'manioc', always found with a classifier
  
  *kuju-çi* 'manioc-CLF:cyl'  \(\rightarrow\)  '*kjuçi* 'manioc branch'
  (iamb)

  *kuju-ji* 'manioc-CLF:field'  \(\rightarrow\)  '*kujuji* 'manioc field'
  (trochee, immunity)

  *kuju-pa* 'manioc-CLF:mass'  \(\rightarrow\)  '*kujpa* 'manioc root'
  (trochee, syncope)
Phonotactics

• 6 types of processes
  • Hiatus resolution by deletion
  • Vowel harmony
  • Consonant change due to adjacent vowel
  • Other hiatus resolution
  • Resolution of disallowed clusters
  • Resolution of disallowed codas
Phonotactics – rule ordering

1. Word formation ← Hiatus resolution by deletion

2. Metrical parse/
   Stress placement
   Consonant change due to adjacent vowel
   Vowel harmony

3. Syncope ← Other hiatus resolution
   Resolution of disallowed C clusters

4. Syllabification ← Resolution of disallowed codas
Phonotactics - Hiatus resolution by deletion

• Applies before syncope
• If no hiatus resolution: \textit{ti-ko-owo-sa-ono} \rightarrow \textit{tko.wo.'so.no}
• With both derivation and inflection, but not w/ person prefix

\begin{tabular}{cccccc}
  ti- & ko- & owo & -sa & -ono & \text{word formation} \\
  t_ & ko & wo & sa & no & \text{hiatus resolution} \\
  ( & x) & (X & .) & \text{metrical parse/stress} \\
  t_ & ko & w_ & sa & no & \text{syncope} \\
  tkow.'sa.no & & & & \text{syllabification} \\
\end{tabular}
Phonotactics - Consonant change due to adjacent vowel + vowel harmony

• /k/ lenition
  • Fricativization-palatalization: k → ç / {front vowel}_a
  • Sibilantization: k → s / {front vowel}_i

• Occurs before syncope, that may delete the trigger

• IRR -a is immune to syncope, unless it triggers V harmony
Phonotactics - Consonant change due to adjacent vowel + vowel harmony

(1) ta- ni -ko-a -po ri ʔi word formation ‘let them eat while they go’
tag ni ka po ri ʔi hiatus resolution
ta ni ça pa ri ʔi palatalization, vowel harmony

(. x) (. X) < > metrical parse/stress
tani ç_ pa r_ ʔi syncope
taniç.'par.ʔi syllabification
taniç'pa:ʔi compensatory lengthening
Phonotactics – Other V hiatus resolution

• Occurs synchronically with syncope
  • The result of V+V never deletes
  • The result of V+V is always the same
• Root node re-association $\rightarrow$ possible consonant change
• 4 processes

  Diphthongization $\{\text{low central V}\}{\text{frontV}} \rightarrow \text{æ}$

  Labialization $\{\text{Labial C}\}{\text{non-front V}}{\text{front V}} \rightarrow \{\text{Labial C}\}w{\text{æ, i}}$

  Palatalization $\{\text{C}_-\text{palatal}\}{\text{front V}}{\text{non-front V}} \rightarrow \{\text{Cj, C}_+\text{palatal}\}{\text{non-front V}}$

  Coalescence $a + u \rightarrow o$
Phonotactics – Other V hiatus resolution

• Palatalization
  • \{C_{-\text{palatal}}\}\{\text{front V}\}\{\text{non-front V}\} \rightarrow \{C_j, C_{+\text{palatal}}\}\{\text{non-front V}\}
  • The root node of front vowel reassociates with the preceding C
  • Secondary articulation or phonemic change (t \rightarrow c, n \rightarrow ɲ)
• If syncope applied first, no need for hiatus resolution and no trigger for consonant change

\begin{align*}
ti\text{-}any\text{-}ku\text{-}?o & \rightarrow \ast tanku\text{-}?o \rightarrow \text{canku}\text{-}?o \\
mak\text{Vni-}ojo\text{-}r\text{'i} & \rightarrow \ast maknijori\text{'i} \rightarrow mak\text{ɲojo}\text{:'i}
\end{align*}
Phonotactics – Other V hiatus resolution

• Syncope applies throughout depending of which hiatus V is weak

\[
\begin{array}{cccc}
\text{ti-} & \text{a} & \text{nu} & \text{-ku} \\
. & x & . & X \\
< & > \\
\text{c} & \text{a} & \text{n} & \text{ku} \\
\text{can.'ku.?o} \\
\end{array}
\quad
\begin{array}{cccc}
\text{ma} & \text{kV} & \text{ni} & \text{-o} \\
(x & .) & (x & .) & (X & .) \\
\text{ma} & \text{k} & \text{no} & \text{jo} \\
\text{mak.no.'jo:?.i} \\
\text{mak.no.'jor.?.i} \\
\text{mak.no.'ri} \\
\text{word formation} \\
\text{metrical parse/stress} \\
\text{syncope and palatalization} \\
\text{syllabification} \\
\text{compensatory lengthening} \\
\end{array}
\]
Phonotactics - Resolution of disallowed C clusters

• Occurs after syncope (C clusters result from syncope)
• 4 processes repairing disallowed consonant clusters

  assimilation of place in nasals  n → m / _{p, m}; n → n / _ç
  nasalization of approximants      y → ñ / n, m_; w → m / m_; β → m / m_
  dissimilation of place in /p/     p → j / _{m, w, β}
  defricativization               /ʃ/ → t / _ {ʃ, s, ts, ç}; /ts/ → t / _ {ts}
Phonotactics - Resolution of disallowed C clusters

• Defricativization

nu- e -ʔo -βi -jo re -ʧi tʃa word formation 'I am going to hit you poor thing'

(. x) (. x) (. X)  <> metrical parse/stress
n_ e _βi j_ re tʃ_ tʃa syncope
neʔ.βij.'reʧ.ʧa syllabification
neʔ.βij.'ret.ʧa dissimilation
Phonotactics - Resolution of disallowed codas

• Occurs after syncope (codas result from syncope)
• Disallowed codas:
  • /r/, cf. eːmana (< Sp. hermana)
  • /w, ß/ before {labial C}
  • /j/ before /j/, ...
• Deletion of disallowed codas triggers compensatory lengthening
Phonotactics - Resolution of disallowed codas

• Compensatory lengthening

nu- wo ro -ʔo word formation
( x) < > metrical parse/stress
n_ wo r_ ?o syncope
'nworʔo syllabification
'nwoʔo compensatory lengthening
Phonotactics – Summary

- Surface form
- Resolution of disallowed clusters and codas
- UR / word formation
- Metrical parse & stress placement
- Consonant change & Vowel harmony
- Syncope & Other hiatus resolution
- Syllabification
- Hiatus resolution
- Resolution of disallowed clusters and codas
Conclusion

Mojeño Trinitario syncope and...
• prosody
• metrical opacity
• the typology of syncope (Gouskova 2003)
• phonological typology
Conclusion – Syncope and prosody

• Syncope as metrical enhancement
  • Syncope creates heavier stressed syllables
  • Stressed syllables are better if they are heavier

• The Iambic/Trochaic Law predicts lengthening of stressed syllables and shortening of unstressed syllables to take place in iambic feet only (Hayes 1995)
  • Syncope applies better with the iambic pattern
  • More immunity with the trochaic pattern
  • How to quantify this?
Conclusion – Syncope and metrical opacity

• Syncope can result in metrical opacity (Kager 1997)
• But in Mojeño Trinitario, moraic stability conserves the initial moraic pattern
  • Problem of initial mora
    • Typologically not syncopated (McCarthy 2008)
    • Maintained in the complex onset (Gordon 2005, Topintzi 2010 on onset weight)
    • If initial vowel is onset-less, then a glottal stop is inserted.
  • Syncope often leads to stress clashes
    • ti-tuma~ma-ko → ttum.'ma.ko
    • su-ku-junopo → skuj.'no.po
Conclusion - Typology of syncope (Gouskova 2003)

• Typology of metrically-conditionned syncope
  • 3 constraints: SWP, PARSE-σ and MAXV
  • 4 patterns:
    i) no syncope/nonmetrical pattern
    ii) deletion of unfootable vowels
    iii) deletion in LL sequences
    iv) deletion in LL sequences and of unfootable vowels
Conclusion - Typology of syncope (Gouskova 2003)

• Typology of differential syncope
  • markedness constraints and MAXV:
    i) nuclei as sonorous as possible (*N_{UC}/x),
    ii) weak foot branches as little sonorous as possible (*M_{ART}/x),
    iii) strong foot branches as sonorous as possible (*P_{KF}/x)

• Mojeño Trinitario does not fit the typology
  • scale is a, e > i > o, u
  • the opposite of *M_{ART}/x: weak foot branches are preferably highly sonorous
Conclusion - Typology of syncope (Gouskova 2003)

• Hybrid system with both metrically-conditionned syncope & differential syncope
  • Lebanese Arabic: deletion of high vowel syllable nuclei, depending on metrical factors
    • = differential syncope constrained by metrical structure
  • Mojeño Trinitario: metrically-conditioned syncope, constrained by vowel sonority
    • Nuclei as sonorous as possible
    • Especially visible in weak foot branches
Conclusion – Syncope and phonological typology

• Drastic typological change in surface phonology
  • more complex syllable structure
  • development of long vowels
  • addition of a consonant /c/ + higher frequency of /ɲ/

• No syncope in Old Mojeño and Mojeño Ignaciano
  • Recent change, within 250 years (between Marbán 1701 and Gill 1957)
  • Widens the gap with closest dialect Ignaciano
Solving puzzle #1

• In the reduplication process, the copy and base may not look similar at all!

(1) ti- či wo -wo -hi word formation 'it's raining a lot'
    (. x) ( . X) < > metrical parse/stress
    tçi w_ wo hi syncope
    tçi.w.'wo.ji syllabification
    tçi.'woji compensatory lengthening
Solving puzzle #2

• The third person prefix has two allomorphs with an unexpected distribution.

\[ ti- \rightarrow t / _C,\{\text{front vowel}\} \]

\[ c / _\{\text{non-front vowel}\} \]

<table>
<thead>
<tr>
<th>ti-</th>
<th>a</th>
<th>mo</th>
<th>word formation</th>
<th>‘it is swollen’</th>
</tr>
</thead>
<tbody>
<tr>
<td>(.</td>
<td>x)</td>
<td></td>
<td></td>
<td>metrical parse/stress</td>
</tr>
<tr>
<td>c_</td>
<td>a</td>
<td>mo</td>
<td>syncope + palatalization</td>
<td></td>
</tr>
<tr>
<td>'ca.mo</td>
<td></td>
<td></td>
<td>syllabification</td>
<td></td>
</tr>
</tbody>
</table>
Solving Puzzle #3

• Adding a morpheme may only show through vowel subtraction.

tanosi. ‘It stayed.’

tansi. ‘Let it stay!’

ta- a- no si word formation ‘let it stay!’
( . x) < > metrical parse/stress
t a n_ si syncope
'tan.si syllabification
Solving Puzzle #4

• Variants of the –ko active suffix that superficially seem to be morphologically conditioned:

\[ \text{ç } / \_ \text{IRR } + \text{CONC.MOT } \quad \text{s } / \_ \text{APPL} \]

(1) na- ni -ko -iʔo  word formation ‘they eat with it’
    na- ni ki ?o  hiatus resolution
    na ni si ?o  develarization
    (. x) < >  metrical parse/stress
    na ni s_ ?o  syncope
    na.'nis.?o  syllabification
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